

REMARKS

Claims 1-17, 21 and 23-25 were previously pending, of which claim 23 has been cancelled, and claims 1, 12, 21, and 25 have been amended. Reconsideration of presently pending claims 1-17, 21, and 24-25 is respectfully requested in light of the above amendments and the following remarks.

Rejections under 35 U.S.C. § 102

Rejections under 35 U.S.C. § 102 in light of Shue

Claims 1, 3-6, 12-14, 17, 21, and 23 were rejected under 35 U.S.C. §102(b) as being anticipated by Shue et al. (US Patent No. 5,970,378 hereinafter referred to as "Shue"). As set forth at MPEP §2131, it is well-established:

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.

With respect to the claims as herein amended, this rejection is respectfully traversed.

Claim 1, as amended, requires:

"...a method comprising: forming a glue layer directly on the first layer, wherein the first layer includes a metal layer; performing an inter-treatment of the glue layer, wherein the inter-treatment...improves an adhesive interface...and includes at least one of a plasma and an electron beam; and depositing the second layer directly onto...the inter-treated glue layer, wherein the inter-treated glue layer improves adhesion...wherein the second layer is a metal layer".

The Examiner states that Shue teaches a first layer as reference number 20c, a second layer as reference numbers 28a, 28b, and a glue layer as reference numbers 22a, 22b. Shue teaches layer 20c is a pre-metal dielectric (PMD), preferably formed of silicon oxide dielectric material (col. 5 lines 10-20). A dielectric layer does not teach a metal layer as required by claim 1, as amended. As such, for at least this reason, Shue does not teach all elements of claim 1.

Claim 12, as amended, requires:

“A method...comprising: depositing a dielectric layer; depositing a first metal layer on the dielectric layer; depositing a glue layer on the dielectric layer and the first metal layer such that an interface is formed directly between the first metal layer and...the glue layer and an interface is formed directly between the dielectric layer and...the glue layer...applying the treatment process...forming a second metal layer on the upper surface of the glue layer, wherein the treatment process enhances an adhesiveness...”

The Examiner argues that Shue teaches a glue layer as reference number 22, a (second) metal layer as reference numbers 28a, 28b, and a dielectric layer as reference number 20c. Shue does not however teach a first metal layer on the dielectric layer and an interface formed directly between the first metal layer and the glue layer as required by claim 12 as amended (see fig. 2). As such, for at least this reason, Shue does not teach all elements of claim 12. Therefore, the rejection is not supported by the Shue reference and should be withdrawn.

Claim 21, as amended, also requires:

“...forming a first metal layer; forming a glue layer on the first metal layer such that an interface is formed directly between metal of the first metal layer and a lower surface of the glue layer...”

The Examiner did not provide citations to Shue as to the argued presence of the elements of claim 21. However, as illustrate above, Shue does not teach forming a first metal layer or an interface directly between metal of a first metal layer and a lower surface of the glue layer as required by claim 21. As such, for at least this reason, Shue does not teach all elements of claim 21. Therefore, the rejection is not supported by the Shue reference and should be withdrawn.

Rejections under 35 U.S.C. § 102 in light of Dixit

Claims 21, 23, and 25 were rejected under 35 U.S.C. §102(b) as being anticipated by Dixit et al. (US Patent No. 6,355,558 hereinafter referred to as “Dixit”). As set forth at MPEP §2131, it is well-established:

A claim is anticipated only if each and every element as set

forth in the claim is found, either expressly or inherently described, in a single prior art reference.

With respect to the claims as herein amended, this rejection is respectfully traversed.

Claim 21 requires:

“A method...comprising: forming a dielectric layer; forming a metal layer on the dielectric layer; forming a glue layer...such that an interface is formed directly between...the dielectric layer and...the glue layer; performing an inter-treatment on the glue layer to alter upper and lower surfaces of the glue layer for improved adhesiveness, wherein the performing the inter-treatment includes using at least one of a plasma and an electron beam; and forming a...metal layer on the...glue layer...

The Examiner states that Dixit teaches a glue layer 44. Dixit teaches TiN layer 44 as a barrier material that may act as a wetting layer (col. 4 lines 45-46). Dixit also teaches the layer 44 having an interface to layer 42 only (see fig. 2c). Layer 42 is a refractory metal layer such as Ti or W (col. 4 lines 15-18). An interface with a refractory metal layer does not teach an interface with a dielectric layer as required by claim 21.

The Examiner also argues that the fortification step to “stuff” the barrier layer 44 teaches the inter-treatment required by claim 21. Dixit however, describes the fortification step to “stuff” the barrier layer 44 as to improve the performance of the barrier layer 44 to keep subsequently deposited Al from diffusing through the barrier layer 44 into the underlying silicon (col. 4 lines 52-56). Dixit fails to teach or even suggest that the fortification step or any step disclosed may improve the adhesiveness of a glue layer as required by claim 21. Furthermore, the fortification step taught by Dixit and referenced by the Examiner requires a high temperature anneal (col. 4 lines 56-62). A high temperature anneal does not teach an inter-treatment including using a plasma or an electron beam as is required by claim 21. As such, for at least this reason, Dixit does not teach all elements of claim 21. Therefore, the rejection is not supported by the Dixit reference and should be withdrawn.

Claim 25 also requires the inter-treatment include at least one of a plasma treatment and an electron beam. Accordingly, as illustrated above, the rejection of claim 25 is respectfully traversed. Furthermore, claim 25, as amended, requires the “the glue

layer is an etch stop layer.”

Dependent Claims

Dependent claims 3-6, 13-14, and 17 depend from and further limit independent claims 1 and 12 respectively and therefore are deemed to be patentable over the prior art.

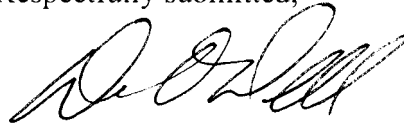
Rejections under 35 U.S.C. § 103

Claims 2, 7-11, 15-16, and 24 were rejected under 35 U.S.C. §103(a). The Applicants respectfully disagree with the Examiner with respect to the art as applied, but in light of claims 2, 7-11, 15-16, and 24 depending from and further limiting allowable claims as illustrated above, the Applicant does not believe additional remarks are necessary and requests allowance of claims 2, 7-11, 15-16, and 24 at least pursuant to the chain of dependency.

Conclusion

An early formal notice of allowance of claims 1-17, 21, 24, and 25 is requested.
The Examiner is invited to telephone the undersigned if further assistance is necessary.

Respectfully submitted,



David M. O'Dell

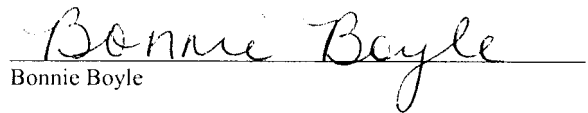
Registration No. 42,044

Dated: March 8, 2007

HAYNES AND BOONE, LLP
901 Main Street, Suite 3100
Dallas, Texas 75202-3789
Telephone: 972/739-8635
Facsimile: 214/200-0853
Client Matter No.: 24061.22
Attorney Docket No.: 2002-0893
Document No.: R-160520

Certificate of Service

I hereby certify that this correspondence is being filed with
the U.S. Patent and Trademark Office via EFS-Web on
March 8, 2007.


Bonnie Boyle